NORTH HILLS CONTROLLED GROUND-WATER AREA PETITION

FINAL ENVIRONMENTAL ASSESSMENT

Prepared by

MONTANA DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION

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List of Acronyms

af …… Acre-feet of water
CDP ……... Census designated places
CGA …….. Controlled ground-water area
DEQ ……..….. Montana Department of Environmental Quality
DNRC …… Montana Department of Natural Resources and Conservation
EA …….. Environmental assessment
EPA …… United States Environmental Protection Agency
gpm ……..… gallons per minute of water
MCA ……... Montana Code Annotated
MCL …… . Maximum contaminant level
USGS ……. United States Geological Survey

Chapter 1. Purpose and Need

A controlled ground-water area is an area where water supply and water quality problems have been identified, or where there could be problems in the future. Water users can petition the state for the designation of a controlled ground-water area. The petition must be signed by one quarter or 20 of the ground-water users in the petition area, whichever is less. In controlled ground-water areas, the state has the authority to manage ground-water development. Outside of controlled ground-water areas, wells that yield less than 35 gallons of water per minute are exempt from most water-permitting requirements.

The Montana Department of Natural Resources and Conservation (DNRC) has received a petition to create a temporary controlled ground-water area (CGA) in the North Hills area in Lewis and Clark County just north of Helena. The petition has been signed by 120 area residents and requests that DNRC:

1) Perform a comprehensive hydrogeologic study of the area as needed to characterize and quantify the current and future availability of ground water;
2) Assess the nature and extent of changes in ground-water quality as a function of current and projected beneficial uses in the proposed North Hills CGA, in cooperation with the Montana Department of Environmental Quality (DEQ);
3) Close the area to further appropriation of ground water, except for replacement wells, during the term of the study.

Before a CGA can be created by petition, there must be alleged facts showing that within the proposed CGA:

a) Ground-water withdrawals are in excess of recharge to the aquifer or aquifers;
b) excessive ground-water withdrawals are very likely to occur in the near future because of consistent and significant increases in withdrawals;
c) significant disputes regarding priority of rights, amounts of ground water in use by appropriators, or priority or type of use are in progress;
d) ground-water levels or pressures are declining or have declined excessively;
e) excessive ground-water withdrawals would cause contaminant migration;
f) ground-water withdrawals adversely affecting ground-water quality are occurring or are likely to occur; or
g) water quality is not suited for a specific beneficial use as defined by 85-2-102(2)(a) MCA.

The petition contains alleged facts that are relevant to the above criteria and has been deemed complete by DNRC. The petition is attached in the back of this EA as Appendix D. An evaluation of the above criteria by DNRC, as it pertains to the North Hills area, is included in Chapter 5.

1.1 Location

The proposed CGA would be in the North Hills area near Helena as depicted in Map 1.

1.2 Scope of the Environmental Analysis

This Environmental Assessment (EA) will assess potential impacts to the human environment if the petition for a CGA in the North Hills were granted, denied, or granted in a modified form. It will analyze the designation of a 2-year temporary CGA with a possible extension of 2 additional years: for four years total. The EA will evaluate the need for a controlled ground-water area, study and temporary closure, and the ability of the agencies to conduct a study. It will also present alternatives to the stipulations sought in the petition, but not a preferred alternative. Nor will the EA be the decision-making document. An administrative hearing process will be held to compile additional facts before DNRC makes a proposal for a decision on the petition.

1.3 Public Involvement

A public scoping meeting for this EA was held on Wednesday, November 7, 2001 at the Jim Darcy School, which is within the boundaries of the proposed CGA. The purpose of the meeting was to identify potential environmental issues and alternatives, and to provide information regarding the petition and DNRC's administrative requirements. The public was also given the opportunity to submit written comments until November 15, 2001.

The draft EA was distributed for public review and comment on January 11, 2002. Comments on the draft EA were accepted during a public meeting on Thursday, January 24, 2002, at the Jim Darcy School, and by mail until January 30, 2002. The draft EA was revised into a final EA following the close of the public comment period.

1.4 Other Agencies With Related Responsibilities

Other government entities have regulatory and review responsibilities that can have an affect on ground-water development in the area. These entities are:

1) The Montana Department of Environmental Quality: subdivision review, review of community water systems and wastewater treatment systems;
2) Lewis and Clark County: subdivision review, septic permits, Water Quality Protection District.

Map 1

1.5 Decision Process and Administrative Hearing Process

DNRC must follow the statutory process and criteria in 85-2-506 through 85-2-508 MCA when reviewing a petition for a CGA. An administrative hearing on the North Hills CGA petition will be held to gather information and arguments supporting and opposing the petition. The administrative hearing will be held following the publication of the final EA. The notice of the hearing will be published in the local paper, and be mailed to each area well driller, landowners and ground-water rights holder within the proposed CGA boundaries, local governments, and state and federal agencies. DNRC will receive oral and written testimony relevant to the designation or modification of the proposed North Hills CGA at the administrative hearing. The procedure will be full, fair and orderly, and all relevant evidence will be received. Because of the technical nature of the statutory criteria, data and expert testimony will be essential to making a case during the process.

After the conclusion of the hearing, DNRC will issue a proposed order with written findings and a proposed decision on the petition. The proposed order will be distributed to parties that participated in the hearing, so that they may have the opportunity to submit exceptions. A final order will be issued following this review of the proposed order and exceptions to it. The final order will contain DNRC's decision on whether or not a controlled ground-water area should be designated. The final order can be appealed to district court.

Chapter 2 – Issues and Alternatives

2.1 Issues

Many issues were brought to DNRC's attention during the public scoping process. Some of the issues, although important, are best addressed during the administrative hearing process, and therefore, will not be discussed in this EA. Listed below by category are a summary of the issues that were raised during the scoping process that will be evaluated in this EA.

<u>Social</u>

1. Is there a need to have a study to evaluate the water supply so we can plan for growth and determine what level of development is sustainable?
2. What are the potential impacts to property rights?

<u>Economic</u>

1. What are the potential economic impacts on existing homeowners, including well replacement costs, of not having a CGA?
2. What are the potential impacts of CGA designation on property values?
3. How will future homeowners be protected from potential economic losses?
4. What are the potential impacts of a declining water table on property values if there is no CGA?
5. What are the potential impacts of a CGA and temporary closure on new residential development?
6. Will there be compensation for potential property rights losses due to CGA designation?

7. What are the potential costs of contesting permit applications?

Need

1. Is there a need for a controlled ground-water area and for a moratorium on new wells?
2. Is there a need for a controlled ground-water area given the existing subdivision requirements of Lewis and Clark County and the Montana DEQ?

Water Supply

1. There is a need to separate drought impacts from those due to human water use.
2. There is a need to collect more data and to evaluate the ability to do a study in 2-to-4 years.
3. Identify where aquifer recharge is coming from, and the travel times and age of recharge water.
4. There is a need to separate the bedrock and alluvial aquifers.
5. There is a need to quantify the thickness of the alluvium over the bedrock.
6. Local aquifer variability needs to be taken into account.
7. The effects of water supplied by the Helena Irrigation District on ground water in the area should be evaluated.
8. The possible recharge of the bedrock aquifer from the Helena Valley alluvial aquifer should be analyzed.
9. Will adding more wells during a study may make the study results unreliable because conditions were not static?
10. The USGS study needs to be reviewed and considered.
11. Define the current level of water use in the proposed CGA.

Water Quality

1. Potential impact to water quality, especially in regards to nitrates, need to be evaluated.
2. What is the action level for nitrates where additional treatment would be required?

Other

1. A weighing and balancing of impacts is needed.
2. Where would DNRC get funding for a ground-water study?
3. Is the water permitting system adequate to address the petitioners concerns?
4. You need to assess the temporary nature of a closure.
5. Where are there new subdivisions being proposed?
6. How can existing users be protected; what is a "call" for water?
7. The possibilities of creating public water and sewer systems should be looked at.
8. How would such a study mesh with ongoing studies by the Lewis and Clark County Water Quality Protection District?

2.2 Alternatives

The purpose of developing project alternatives is to attempt to resolve issues or potential problems with a proposal. In addition to the *No Action* and *Petition Proposal*, three other alternatives known as the *Modified Permit Process Alternative*, *Adjusted CGA Boundaries Alternative, and Water Quality Study Alternative* were developed after considering the major issues raised during scoping. Another alternative, known as the *Ground-Water Study Alternative*, was added in response to comments on the draft EA. Under all the action alternatives, the controlled ground-water area designation would be temporary: for two years with a possible extension to 4 years.

Alternative 1 – No Action Alternative

Under the *No Action Alternative*, the petition would be denied and there would be no temporary controlled ground-water area in the North Hills. Drilling of wells and development would continue as it has under existing procedures and regulations.

Alternative 2 – Petition Proposal Alternative

This alternative would be the *Petition Proposal* which would require DNRC to:

1) Perform a comprehensive hydrogeologic study of the designated area as needed to characterize and quantify the current and future availability of ground water;
2) In cooperation with the Montana Department of Environmental Quality (DEQ), assess the nature and extent of changes in ground-water quality as a function of current and projected beneficial uses in the proposed North Hills CGA;
3) Close the area to further appropriation of ground water, except for replacement wells, during the term of the study.

Alternative 3 – Study with Modified Permitting Process Alternative

The *Modified Permit Process Alternative* was developed in an attempt to balance the concerns of the petitioners with those who oppose a temporary closure, and to consider study funding concerns. It would include a ground-water supply study as described under Alternative 2, but not a ground-water quality study. It also differs from Alternative 2 because, during the duration of the study, DNRC would not close the area to ground-water appropriation but instead would:

1) Initiate temporary water right permitting procedures for all new ground-water appropriations (including those for less than 35 gpm and 10 acre-feet per year) during the two-to-four year period. This alternative would include allowing water right holders to object to all new water permit applications.
2) Require ground-water data to be submitted with all water right permit applications as part of a temporary controlled ground-water area, to support ongoing evaluation of the availability of ground water and the potential for adverse impacts to current and future water users. The required information would include: (1) a detailed drillers log containing descriptions of lithologies, well construction methods, and the depth of occurrence of water, and (2) the results of a well-yield test.

3) Initiate a hydrogeologic study of the designated area as needed to characterize and quantify the availability of ground water for appropriation and the potential for adverse impacts to current water users.

Alternative 4 – Adjusted CGA Boundaries Alternative

The *Adjusted CGA Boundaries Alternative* can be combined with either Alternative 2, 3, 5 or 6, but with boundaries modified to only include areas where the primary water source is the pre-Tertiary age bedrock aquifer (Map 2). Areas where alluvial aquifers are thought to be the primary water source, would be excluded from the CGA. The excluded areas also are down gradient of the Helena Valley Canal, which may be providing some ground-water recharge. Map 2 depicts the boundaries of the potential CGA under this alternative.

Alternative 5 – Water Quality Study Alternative

The *Water Quality Study Alternative* is the same as the *Modified Permit Process Alternative* (Alternative 3) with the addition of a provision to initiate a study of the nature and extent of changes in ground-water quality as a function of current and projected beneficial uses. The water quality portion of the study would focus on the collection and analysis of data on nitrates in ground water. In addition to the requirements under Alternative 3, new permit applicants would be required to have the water in their well sampled and analyzed for nitrate, specific conductance, and total coliform bacteria, and submit the results of this analysis to DNRC. Water quality and potential impacts to water quality at nearby wells would be considered when evaluating all new permit applications (including those for less than 35 gpm and 10 acre-feet or less per year), during the 2-to-4 year period. The water quality review procedures would be developed in cooperation with DEQ.

Alternative 6 – Ground-Water Study Alternative

The *Ground-Water Study Alternative* would initiate a study of the ground-water supply and quality in the proposed CGA area in a similar manner as was suggested under Alternatives 3 and 5. But it would not require applications for wells that pump less than 35 gpm and 10 acre-feet per year to go through the water permitting process, or allow for objections to these applications. To receive a certificate of water right, applicants for wells intended to produce less than 35 gpm and 10 acre-feet per year would be required to submit specific information to be collected by a qualified geologist or hydrogeologist in addition to the appropriate forms and fee. The required information would include: (1) a detailed drillers log containing descriptions of lithologies, well construction methods, and the depth of occurrence of water, (2) the results of a well-yield test, and (3) a water quality analysis for nitrate, specific conductance, and total coliform bacteria.

Map 2

Chapter 3 – Existing Environment

3.1 Ground-Water Resources

Wells in the proposed North Hills CGA obtain water primarily from Precambrian age bedrock of the Spokane and Greyson formations (Thamke, 2000). The Spokane and Greyson formations consist of mostly fine-grained sediments, originally clay and silt with thin layers of sand and limestone, that have been compacted and heated during burial. A number of wells at the south end of the area obtain water from Tertiary age sedimentary rocks and unconsolidated alluvium where these younger rocks overlay Precambrian bedrock. Tertiary age rocks consist of semi-consolidated clay, silt, sand, gravel and volcanic ash deposited in streams and lakes, and alluvium consists of unconsolidated clay, silt, sand and gravel deposits (Briar and Madison, 1992). Map 3 depicts the geology in the proposed CGA.

Faulting, fracturing, and folding that occurred during mountain building further modified Precambrian age rocks. The Helena Valley Fault bounds the north edge of the Helena Valley and is the most extensive geologic structure in the proposed North Hills CGA (Thamke, 2000). Numerous other faults have been mapped during various investigations (Schmidt, 1986; Stickney and Bingler, 1981), and countless other faults and fractures have not been mapped because they are obscured or are too small. Because the Precambrian age rocks beneath the North Hills have been compacted and cemented, faults and fractures are the primary paths for water flow. These faults and fractures interconnect to varying degrees and probably form a system of essentially separate aquifers rather than a single continuous aquifer. Ground water flows through this aquifer system from higher elevations toward the Helena Valley aquifer to the south.

The amount of ground-water development that can be sustained in the North Hills depends on the properties and boundaries of the bedrock aquifer, the pattern and amount of recharge, and the pattern of ground-water development (Bredehoeft et al, 1982). Variable and often unpredictable hydrogeologic conditions within the North Hills, in addition to variable well construction, result in considerable differences in depths and yields of wells, often over relatively short distances (Maps 4 and 5). The combination of these factors needs to be considered in order to assess the potential for future ground-water development.

Aquifer Properties

There is evidence that continuous fault zones may transmit considerable amounts of water locally in the North Hills. However, in other instances, faults or fractures that contain clay or are poorly connected to other fractures may transmit significantly less ground water or act as barriers to ground-water flow. In addition, because fracture openings are the only paths for ground water in the North Hills bedrock, the overall capacity of the rock to store water is highly variable but generally low.

The amount of water that can be transmitted and stored in fractures and faults intersected by a well directly affects well yield, and water level response to pumping and variations in recharge. Over a larger area, the degree that faults intersected by wells are connected to areas of ground-water recharge or discharge, affects long-term sustainability of yields and water levels. The volume of water stored in an aquifer affects fluctuations in its water level.

Map 3

Map 4

Map 5

Recharge

Recharge to the North Hills aquifer system varies considerably as a result of seasonal and multi-year cycles of precipitation, variable soil and aquifer properties, vegetation, and terrain. Evaporation and plant needs in the North Hills are large compared to the 10 to 16 inches of average annual precipitation (derived from regional precipitation maps as presented in Thamke 2000). As a result, water only infiltrates past the root zone during intense storms or snowmelt events, or where water infiltrates from streams (Thamke, 2000). Once water moves past the root zone it only reaches ground water after soil moisture depleted during dry periods is replenished. Water may also infiltrate the aquifer through fractures where bedrock is exposed or is near the surface, and has sufficient storage and water transmitting capacity. Ultimately, the bedrock aquifer system beneath the North Hills is probably recharged infrequently in certain areas followed by possibly extended periods when water levels decline as water drains or is withdrawn from storage (Thamke, 2000).

Development

Wells always initially draw water from storage in an aquifer, resulting in some amount of water level decline (Theis, 1940). The duration and amount of water level decline from new ground-water development in the North Hills will depend on the aquifer properties described above, the proximity of wells to areas of ground-water recharge and discharge, and the amount and pattern of recharge. The amount of water level decline from pumping also depends on the amount of pumped water that is consumed and the amount that returns to the aquifer. In the North Hills, water used for irrigating lawns, gardens, and crops is probably mostly consumed through evaporation and plant use. In contrast, much of the water used indoors may eventually return to the aquifer through septic systems.

Sustainability of ground-water development in the North Hills has been addressed in past studies to varying degree. Briar and Madison (1992) estimated total ground-water discharge from bedrock surrounding the Helena Valley as the difference between estimated inflows and outflows calculated from a water balance for the valley-fill sediments. A U.S. Geological Survey (USGS) study conducted from 1993 to 1998 (Thamke, 2000) is the first research study to directly address water resources in the bedrock aquifer system. In the USGS study, water level measurements in 24 wells, water samples from 15 wells, and existing streamflow and precipitation data were used to make general conclusions about water availability in the North Hills. A summary of the findings from these reports are attached in Appendix A.

The USGS continues to monitor water levels in six of the wells that were monitored for the Helena Area Bedrock Study (Thamke, 2000). Water levels measured from the early-to-mid 1990s to present for these six wells are presented in Appendix B. Graphs of precipitation data for this time same period are included in Appendix C.

Water Quality

Effluent from septic systems containing nitrates and pathogenic microorganisms can infiltrate ground water and reach water supply wells. Elevated levels of nitrates in drinking water can cause various health effects including a serious illness in infants known as “blue baby syndrome”. Microbial contaminants including fecal coliform, E coli, and cryptosporidium may cause gastrointestinal problems that can be particularly serious in infants and people with compromised immune systems. The U.S. Environmental Protection Agency has designated a

Maximum Contaminant Level (MCL) of 10 mg/L nitrate (as N) and any occurrence of microbial contaminants as thresholds that must not be exceeded in water from public water systems.

Lewis and Clark County began permitting on-site water treatment systems in 1973 (Lewis and Clark County Plan 2000). Prior to that, on-site wastewater treatment systems were not required to meet any standards. In 1993, the State of Montana adopted minimum standards for on-site wastewater treatment systems that mandated all counties in Montana follow the minimum standards. The amount of nitrate released to the environment from a septic system depends on the composition of the wastewater and the design of the septic tank and drain field. Effluent from a properly functioning septic system contains roughly two to seven times the drinking water limit of 10 mg/L nitrate (Wilhelm et al, 1994). Once released to ground water, the persistence of nitrate and microbial contaminants depends on the physical and chemical conditions in soils and aquifer materials encountered by septic effluent. Dilution and denitrification, a process that uses organic carbon to convert nitrate to nitrogen gas, can lower nitrate concentrations in ground water. Low dispersion and absence of organic carbon in fractured bedrock such as the North Hills aquifer system may limit dilution and denitrification, however (Wilhelm et al, 1994).

Elevated concentrations of nitrates in ground water have been documented in areas of concentrated septic systems, including areas of the Helena Valley (Drake, 1995). Nitrate concentrations in wells in the North Hills are available from the USGS bedrock study (Thamke, 2000) and ongoing sampling by the Lewis and Clark Water Quality Protection District (Map 6). These data indicate concentrations of nitrates greater than the MCL have been detected in three wells and that concentrations may be elevated in other wells.

3.2 Land Use

Existing land-use in the proposed CGA is low-density housing, higher-density housing in a few of the larger subdivisions, a few commercial businesses, farming, and forest and rangeland. A synopsis of the main land uses in the area is represented by the water-rights records. Figure 1 shows total ground-water rights volumes in the proposed CGA area by purpose. The majority of the ground-water rights are for domestic use, and residential lawn and garden use. Water rights for community water systems are a substantial portion of the total. Agricultural uses for irrigation and stock watering also are significant, and some of the lands in the southern portion of the CGA are irrigated with water from the Helena Valley Canal.

The amount of land in the area that was subdivided for homes increased during the 1990s. Figure 2 shows county subdivision trends from 1986 through 1999. Figure 3 depicts a similar increase in the number of water rights granted, with the low activity during the mid 1980s to early 1990s followed by a noticeable increase starting about 1994.

A portion of the proposed CGA would be in a “Transitional Growth Area” (see Map 7) as defined in the Lewis and Clark County Comprehensive Plan (Lewis and Clark County 2000). Transitional growth areas are designated in the County Plan as areas that are not contiguous to existing urban development, but suitable for urban development over a longer term. Commercial uses are encouraged to locate within these areas, especially in the portions near the intersections of major roads.

Map 6

Map 7 Transitional Growth Area

Figure 1. Total ground-water rights volumes in the North Hills area by purpose (source: DNRC water-rights data base.

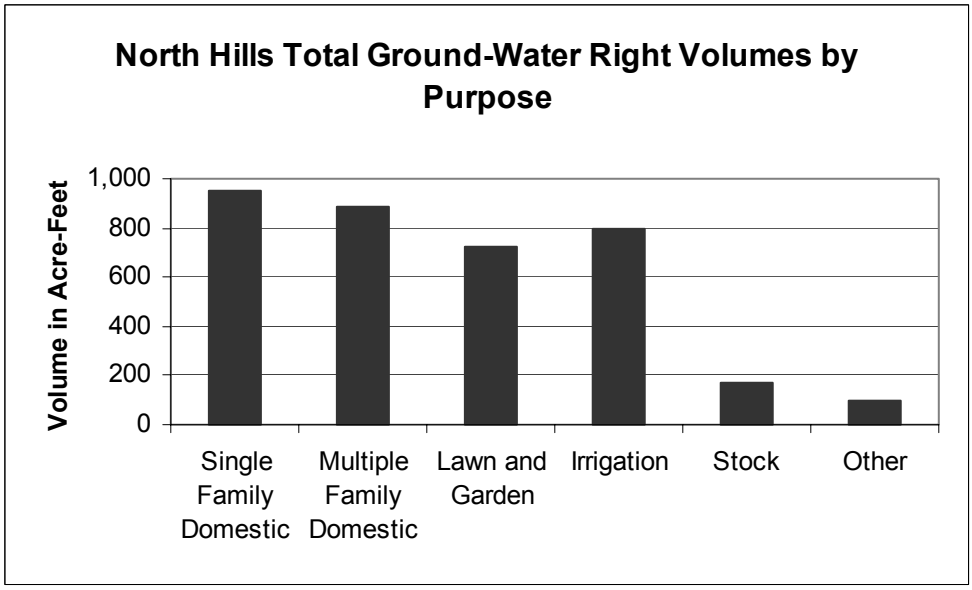


Figure 2. Lots created in Lewis and Clark County by the subdivision review process (source: Lewis and Clark County, undated).

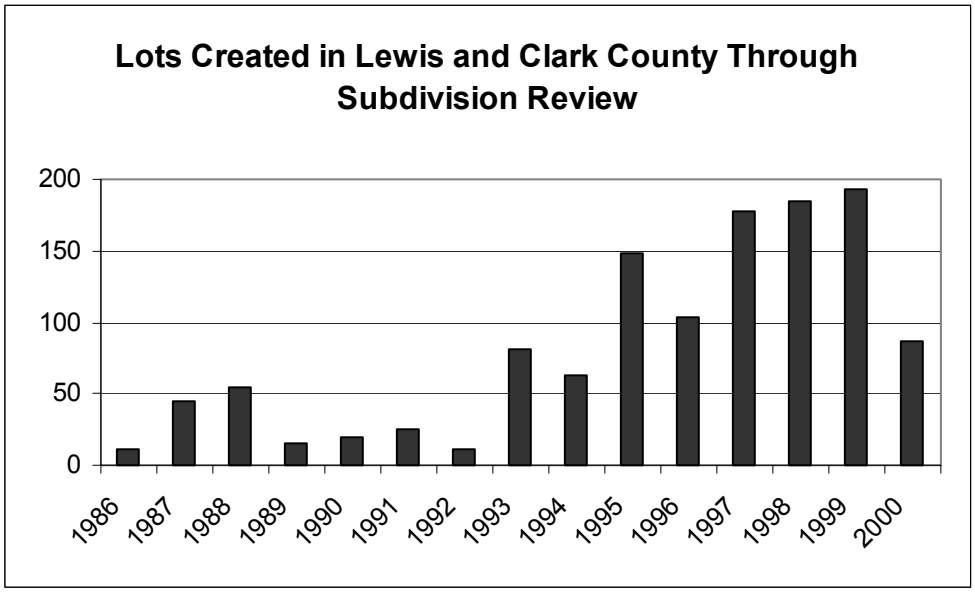
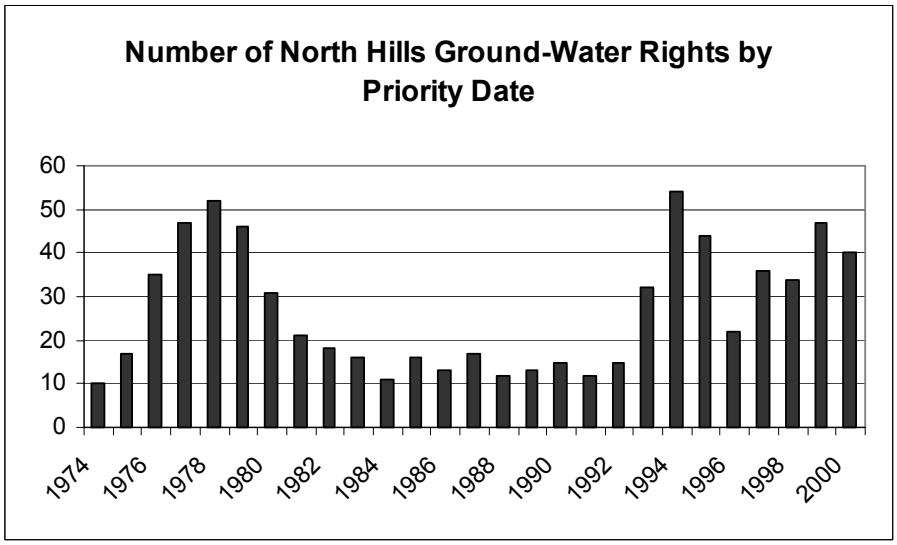


Figure 3. Number of water rights granted in the North Hills area by priority date (source: DNRC water-rights data base).



3.3 Demographics

The pertinent demographic data for the Census Designated Places (CDPs) that contain the portions of the proposed controlled ground-water area describe an area growing rapidly in terms of population and number of households (U.S. Department of Commerce, Census Bureau. 2001). The Helena Valley Northeast and Helena Valley Northwest CDPs represent the areas of the Helena Valley north of Lincoln Road; they are separated by Interstate 15. While these CDPs when combined do not conform exactly to the proposed controlled ground-water area, the proposed CGA comprises the majority of the area of the two CDPs. The U.S. Census Bureau began reporting data for these CDPs in the 1990 Census.

Population

Table 1 shows that the population for both the Helena Valley Northeast and Helena Valley Northwest CDPs grew 50 percent between 1990 and 2000. Most of this growth occurred in the Helena Valley Northwest CDP which grew 71.4 percent during the period. The rates of growth in these areas vastly exceeded the rates of population growth for Helena, the rest of the Helena Valley and Lewis and Clark County and the state which saw rates of growth ranging from 4.8 to 17.3 percent.

Table 1. Area population trends--1980-2000.

	1980	1990	2000	Percentage Change 1990-2000
Montana	786,690	799,065	902,195	12.9
Lewis and Clark County	43,039	47,495	55,716	17.3
Helena Valley	38,863	42,883	45,819	10.7
Helena	23,938	24,609	25,780	4.8
Helena Valley NE		1,585	2,122	33.9
Helena Valley NW		1,215	2,082	71.4

As displayed in Table 2, the median age of residents in the area increased during the 1990s as it did in Helena and in the rest of the county and state. In 1990, the median age for the area was significantly lower than the rest of the county and state. By 2000, the median age for the eastern part of the area (39.4) exceeded that for Helena, the county and the state while the median age in the western part of the area remained lower than that for Helena, the county and the state.

Table 2. Median age of area residents—1990-2000.

	1990	2000
Montana	33.8	37.5
Lewis and Clark County	34.0	38.0
Helena	34.9	38.8
Helena Valley NE	28.3	39.4
Helena Valley NW	30.4	35.4

As would be expected in an area of rapid population growth, the number of households--or occupied housing units--also expanded rapidly during the 1990s. Table 3 shows that the number of households in the north Helena Valley increased 65.6 percent between 1990 and 2000, a rate far greater than in Helena and elsewhere in the county and state. The number of households nearly doubled in the northwestern part of the Helena Valley.

Table 3. Area household number trends—1990-2000.

	1990	2000	Percentage Change 1990-2000
Montana	306,163	358,667	17.1
Lewis and Clark County	18,649	22,850	22.5
Helena	10,421	11,541	10.7
Helena Valley NE	537	776	44.5
Helena Valley NW	379	741	95.5

The trend toward smaller households occurred throughout the Helena Valley, Lewis and Clark County, and Montana as displayed in Table 4. Average household sizes in the area in 1990 and 2000 were greater than in the county and state and decreased at a far greater rate (14 percent) during the period. The decrease in household size is consistent with trends reflecting higher median age, smaller family sizes, higher population, and increasing housing density in the area.

Table 4. Household size trends--1990, 2000.

	1990	2000	Percentage Change 1990-2000
Montana	2.53	2.45	-3.2
Lewis and Clark County	2.47	2.38	-3.6
Helena	2.23	2.14	-4.0
Helena Valley NE	3.12	2.68	-14.1
Helena Valley NW	3.25	2.81	-13.5

3.4 Economics

Property Values and Water

The market value of residential property is a function of many factors, both external to and inherent in a particular property. The growth of the surrounding area and the scarcity of land suitable for development as well as the proximity to places of employment, commercial, educational, and recreational sites are factors external to a piece of property that affect its value. Characteristics of property in a location like the North Hills that determine its value can include the presence of trees, the view from the property, the size of the parcel, the availability of owner financing, and access to roads, gas and electricity, and water. A survey of property listings and sales in the area (derived from advertisements, discussions with local realtors, and sales data from the Multiple Listing Service) reveals a wide range of land prices varying with such characteristics of residential property. Prices range from $2,000 per acre to $35,000 per acre on parcels ranging from 2 acres to 20 acres in size.

The economic value of a parcel of property to a buyer reflects the relative stream of benefits likely to occur from property ownership. A buyer's perception of the likelihood of the occurrence of such a stream of benefits introduces an element of risk into the decision to invest in a parcel of property. For example, in considering an investment in a parcel of property, a buyer may assess the likelihood of the continuation of a strong trend in local growth or the development of a premium golf course on an adjacent parcel. To the extent that he assumes that such developments are likely, the buyer speculates on the value of the property under consideration.

Similarly, a buyer will consider the relative likelihood of a property's access to water in deciding whether to invest in that property. Access to potable water is more likely in hydrogeologically favorable locations and on properties with seniority in the water rights regime. Ultimately, a buyer increases the likelihood of accessing water through establishing a properly engineered well in a productive aquifer or obtaining water right seniority through which he can call junior water right holders or propose a controlled ground-water area. The effective exercise of senior water rights can protect senior water right holders from diminution of their rightful water use by junior water right holders. Each of these means of ensuring more reliable access to water entails potentially significant cost. In a properly functioning market, property values should reflect the perceived risk associated with the uncertainty regarding the availability of water for a particular property.

Chapter 4 – Potential Impacts of the Alternatives

4.1 Ground-Water Resources

Alternative 1 - No Action Alternative

Under the *No Action Alternative*, ground-water development will proceed under existing procedures and regulations. The total number of wells will increase and additional larger production wells may be permitted. New wells might impact water levels of existing wells if the additional withdrawals cannot be sustained, and well owners may need to lower their pumps or deepen their wells. Longer term, water may need to be brought from outside the North Hills in a worst case of extreme overdraft of the North Hills aquifer.

Alternative 2 - Petition Proposal Alternative

Under the *Petition Proposal Alternative*, ground-water development will be limited to replacement wells for the duration of the proposed hydrogeologic study. No additional wells will be drilled while the hydrogeologic study is being conducted, and impacts on water levels of existing wells will be limited to that caused by existing development.

Alternative 3 - Study with Modified Permitting Process Alternative

Under the *Modified Permitting Process Alternative*, domestic and stock watering wells will be permitted under a modified process and applications for larger production wells will proceed under existing procedures and regulations. Additional wells will be permitted during the hydrogeologic study and, as a result, there will be greater ground-water withdrawals while the hydrogeologic study is proceeding than under Alternative 2. However, information will be collected from each new well to help improve the understanding of water availability and the potential for adverse impacts to existing wells, resulting a greater chance that sufficient information will be obtained to evaluate the need for a permanent CGA. Additional wells will change the ground-water conditions being studied to some degree, however the study will not be compromised because ground-water conditions are always changing.

Wells will not be sampled to assess the nature and extent of nitrate contamination as specified under Alternative 2, 5, and 6. As a result, areas where beneficial uses are impaired by elevated nitrate concentrations will not be detected.

Alternative 4 - Adjusted CGA Boundaries Alternative

Under the *Adjusted CGA Boundaries Alternative*, ground-water development will proceed under existing procedures and regulations in the sections omitted from the CGA. The impacts described for Alternative 1 may be experienced in the sections omitted from the area included in Alternative 2 and possibly in adjacent areas inside the adjusted CGA boundaries.

Alternative 5 - Water Quality Study Alternative

Under the *Water Quality Study Alternative*, water samples will be collected from all new wells and analyzed for nitrate. Impacts will be the same as described under Alternative 3 except that the nature and extent of nitrate contamination will be evaluated to determine whether beneficial uses are impaired.

Alternative 6 - Ground-water Study Alternative

Under the *Ground-water Study Alternative*, additional wells will be permitted during the hydrogeologic study and, as a result, there will be greater ground-water withdrawals while the hydrogeologic study is proceeding than under Alternative 2. However, information will be collected from each new well to help improve the understanding of water availability, water quality, and the potential for adverse impacts to existing wells, resulting a greater chance that sufficient information will be obtained to evaluate the need for a permanent CGA. Additional wells will change the ground-water conditions being studied to some degree, however the study will not be compromised because ground-water conditions are always changing.

4.2 Land Use

Alternative 1 - No Action Alternative

Under this alternative, existing land-use trends in the CGA would continue. Homes with wells would be constructed in existing subdivisions, and new subdivisions would be created in a similar way as they are now.

Alternative 2 - Petition Proposal Alternative

Under this alternative, land-use changes from agricultural and rangeland to residential development in the CGA would be substantially reduced in the short-term (2-to-4 years) because access to ground water for new appropriation would be restricted. Because of the restrictions in place in the CGA, builders may seek to construct new homes elsewhere. Hence, the temporary moratorium on ground-water permitting in the CGA could result in an indirect impact of increased well drilling and home construction in areas outside of the CGA boundaries.

Alternative 3 - Study with Modified Permitting Process Alternative

Under this alternative, new development of land for residential use would continue where landowners are successful at obtaining a ground-water permit. Access to water would be restricted and residential development would be reduced where ground-water permits are denied as a result of concerns over water availability or the potential for adverse effects.

Alternative 4 - Adjusted CGA Boundaries Alternative

Impacts under this alternative would be similar to those discussed under Alternatives 2 and 3 for areas within the CGA. For areas that have been excluded from the CGA, impacts would be similar to those described under Alternative 1.

Alternative 5 - Water Quality Study Alternative

Impacts under this alternative would be similar to those described under Alternative 3, except that some new development may be restricted where nitrate exceeds specified limits.

Alternative 6 - Ground-Water Study Alternative

Impacts to land use under this alternative would be similar to existing conditions. Homes with wells would be constructed in existing subdivisions, and new subdivisions would be created in a similar way as they are now, because the only additional requirement for new ground-water use would be that the applicant submit ground-water occurrence and quality data.

Property Rights

The water in the ground belongs to the state, and a water right gives a person the legal right to take water and use it beneficially. A water right allows the holder to use water when it is legally and physically available; it does not guarantee that the water will be there all of the time.

In Montana the value of land is often a function of available water and access to it. Because a temporary closure on new water-well drilling would restrict access to ground water for new development, the *Petition Proposal Alternative* could be construed by some as temporarily precluding development opportunities. If this alternative were chosen, it is possible that some landowners could contest a temporary closure and pursue compensation for alleged losses in property value, but this type of question would need to be resolved by the courts.

4.3 Demographics

Alternative 1 - No Action Alternative

Demographic trends would proceed as they would have absent the proposal over the next two to four years.

Alternative 2 - Petition Proposal Alternative

A moratorium on ground-water development would curtail growth within the proposed CGA boundaries. To the extent that growth and demand for housing in the Helena area continues during the moratorium, the growth that would have occurred in the proposed CGA would occur elsewhere.

Alternative 3 - Study with Modified Permitting Process Alternative

Growth in the area would be reduced to the extent that development is discouraged by a more rigorous permitting process.

Alternative 4 - Adjusted CGA Boundary Alternative

As development proceeds in areas omitted from the proposed CGA, demographic trends are likely to continue as they would absent the proposal. Areas remaining within the boundary would be affected as described in the Alternative 2 discussion.

Alternative 5 - Water Quality Study Alternative

Growth in the area would be reduced to the extent that development is discouraged by a more rigorous permitting process.

Alternative 6 - Ground-Water Study Alternative

Demographic trends would proceed as they would have absent the proposal over the next two to four years.

4.4 Economics

Alternative 1 - No Action Alternative

To the extent that such costs occur, existing well owners would continue to incur costs imposed by additional well development over the next two to four years. Such costs might include replacing and deepening wells and costs associated with contesting ground-water permits. At drilling costs of $18 per foot, replacing a well can cost up to $4,000. In a worst case scenario, water might need to be hauled in from outside of the area or provided through the development of a community water system. Such prospects are likely to diminish the value of homes and property in the area. The continued uncertainty regarding the status of ground water in the area tends to weight downward the economic value of properties with access to abundant, reliable water.

Alternative 2 - Petition Proposal Alternative

Because new wells would not be allowed, current well owners would incur fewer costs from impacts that would occur under the No Action Alternative, assuming that the decrease in ground-water levels is due to the increase in pumping. They may have less need to replace and deepen wells and object to new permits.

Those property owners with reliable access to water whose development might not impact existing wells would have increased difficulty developing or selling property during the moratorium. The prospect of no new wells under a potential controlled ground-water area will negatively impact the value of their property during the two- to four-year period. The study of water availability in the area, however, may demonstrate that these properties have access to water without negatively impacting existing wells. Such a study would reduce uncertainty over access to water for themselves and potential buyers of their property. This reduction in uncertainty regarding the status of their properties' access to water may increase the value of their property.

Those property owners whose property is found to have limited physical and legal access to water would also have difficulty developing or selling their property during the two- to four-year period. However, it is not likely that they or subsequent buyers could have developed their properties without substantial cost to themselves or imposing costs on existing well owners. The proposed study may bear this out and this information is likely to reduce the uncertainty regarding the properties' access to water. The status of water availability--both physical and legal--described in the study will probably be reflected in the properties' market values.

Alternative 3 - Study with Modified Permitting Process Alternative

The costs borne by affected well owners described in Alternative 1 would continue under this alternative although to a lesser extent due to probable fewer applications and a lengthier permitting process and less development.

While the costs borne by property owners due to the moratorium described in Alternative 2 would not occur in this alternative, they would incur additional costs related to the more rigorous permitting process. These property owners would still be affected by the uncertainty cast by the prospect of a controlled ground-water area, however.

The benefits of better information described in Alternative 2 would occur under this alternative.

Alternative 4 - Adjusted CGA Boundary Alternative

For the omitted areas.

To the extent that such costs occur, existing well owners would continue to incur costs imposed by additional well development over the next two to four years. Such costs might include replacing and deepening wells and costs associated with contesting ground-water permits. At drilling costs of $18 per foot, replacing a well can cost up to $4,000. In a worst case scenario, water might need to be hauled in from outside of the area or provided through the development of a community water system. Such prospects are likely to diminish the value of homes and property in the area. The continued uncertainty regarding the status of ground water in the area tends to weight downward the economic value of properties with access to abundant, reliable water.

For areas still included in CGA boundaries.

Because new wells would not be allowed, current well owners would incur fewer costs from impacts that would occur under the No Action Alternative, assuming that the decrease in ground-water levels is due to the increase in pumping. They may have less need to replace and deepen wells and to object to new permits.

Those property owners with reliable access to water whose development might not impact existing wells would have increased difficulty developing or selling property during the moratorium. The prospect of no new wells under a potential controlled ground-water area will negatively impact the value of their property during the two- to four-year period. The study of water availability in the area, however, may demonstrate that these properties have access to water without negatively impacting existing wells. Such a study would reduce uncertainty over access to water for themselves and potential buyers of their property. This reduction in uncertainty regarding the status of their properties' access to water may increase the value of their property.

Those property owners whose property is found to have limited physical and legal access to water will also have difficulty developing or selling their property during the two- to four-year period. However, it is not likely that they or subsequent buyers could have developed their properties without substantial cost to themselves or imposing costs on existing well owners. The proposed study may bear this out and this information is likely to reduce the uncertainty regarding the properties' access to water. The status of water availability--both physical and legal--described in the study will probably be reflected in the properties' market values.

Alternative 5 - Water Quality Study Alternative

The costs borne by affected well owners described in Alternative 1 would continue under this alternative although to a lesser extent due to probable fewer applications and a lengthier permitting process and less development.

While the costs borne by property owners due to the moratorium described in Alternative 2 would not occur in this alternative, they would incur additional costs related to the more rigorous permitting process, including those related to water quality. These property owners would still be affected by the uncertainty cast by the prospect of a controlled ground-water area, however.

The benefits of better information described in Alternative 2 would occur under this alternative.

To the extent that such costs occur, existing well owners would continue to incur costs imposed by additional well development over the next two to four years. Such costs might include replacing and deepening wells and costs associated with contesting ground-water permits for wells over 35 gpm or 10 acre-feet per year. At drilling costs of $18 of per foot, replacing a well can cost up to $4,000. In a worst case scenario, water might need to be hauled in from outside of the area or provided through the development of a community water system. Such prospects are likely to diminish the value of homes and property in the area.

The study of water availability in the area may demonstrate that particular properties have access to water without negatively impacting existing wells. Such a study would reduce uncertainty over access to water for owners and for potential buyers of these properties and this reduction in uncertainty may increase the values of these properties. The proposed study may also show that other properties have limited physical and legal access to ground water and this information is likely to reduce the uncertainty regarding the properties' access to water. The status of water availability--both physical and legal--described in the study would probably be reflected in the properties' market values.

Chapter 5 – Need and Evaluation Criteria

5.1 Need

During the public scoping process, some questioned the need for a controlled ground-water area by making the case that existing regulations and permit requirements provide adequate protection to the prior water users. Are existing water rights and subdivision requirements sufficient to protect existing ground-water users from potential adverse affects to water quantity and quality?

All ground-water use requires a water right and DNRC administers water rights. Larger new wells (those greater than 35 gallons per minute (gpm) and using 10 acre-feet or more per year) require a water right that only can be obtained through the permitting process. That process requires the applicant to pay a $200 fee, and to provide a preponderance of evidence to demonstrate that water is physically and legally available, and that the new use will not adversely affect the rights of existing well owners. In addition, other water right holders have the opportunity to object to issuance of the new water right (for a $25 fee), or to recommend conditions to prevent adverse effects. Failure by the applicant to prove the above criteria would allow DNRC to deny the new water right. For smaller new wells (less than 35 gpm, not to exceed 10 acre-feet per year) outside of controlled ground-water areas, DNRC has no authority to deny a water right if the paperwork is properly completed and the $25 fee is paid.

In the North Hills, the majority of water rights on file are for wells that pump less than 35 gpm, although larger wells account for a substantial portion of the total permitted volume (see Table 5). Some existing users are frustrated because they cannot contest the smaller well permits. At the public scoping meeting, others countered that senior water users are protected because they can place a “call” for water when they believe that pumping by junior users is harming them.

Table 5. Wells in the proposed CGA that are less than 35 gallons per minute compared to those that are greater than 36 gpm (source: DNRC water-rights data base).

	Total Filed	Total Rate in gpm	Total volume in acre-feet
0-to-35 gpm	764	12,756	1,809
36 gpm and greater	32	3,395	1,160

Water rights have an associated priority date, which is the date the right was filed, and, in general, first in time is first in right. If a water right holder believes that pumping by other junior water users are unreasonably affecting their ability to obtain water, the senior user can "make call" on those junior users. That means personally contacting the junior right-holders face-to-face, by phone, or by letter, explaining the situation, and requesting that they shut off or reduce their use. If the junior user refuses, the senior user can file a complaint with DNRC as the first step, and DNRC may investigate the situation and make a report or recommendation. For the larger, permitted wells, DNRC may be able to have the junior user halt use in a worse-case scenario where there is evidence to demonstrate adverse impact. Generally, however, water rights are treated as private property, and as such it is up to the owners to enforce their own rights through the courts if DNRC cannot resolve the dispute through voluntary compliance. Seeking the court's assistance will require proof that the water shortage problems are being caused by junior water users. And this may require that the senior user hire a professional water resources consultant, as well as an attorney. Of course, this can be costly and sometimes it may be cheaper for the senior user to deepen the well, if water is available deeper, or to drill a new one. Or the senior user could seek reimbursement for lawsuit costs. In summary, ground-water rights enforcement is a difficult and often expensive procedure.

The need for a controlled ground-water area also was questioned because some believe that the subdivision rules of DEQ and Lewis and Clark County require review that is adequate to protect the prior water user.

The Montana Department of Environmental Quality (DEQ) is responsible for reviewing public water supply systems and public wastewater treatment systems for subdivisions. For public water systems that are supplied by wells, DEQ usually requires the developer to pump-test the well for 24-hours at a rate of 1.5 times the proposed capacity of the system to demonstrate that water is available. For proposed new subdivisions in the North Hills that do not include a public water system, since the summer of 2001 DEQ has required developers to submit some data to demonstrate that ground water is likely to be available for the subdivision (Regensburger 2001). Minor subdivision proposals of one-to-five parcels are reviewed by Lewis and Clark County under contract with DEQ. In all cases, DEQ and the county require data only to determine whether there is likely to be enough water for the proposed developments: not to analyze potential impacts to prior water users.

The subdivision review process is only required for new subdivisions and not for land that has already been subdivided. An analysis by the Lewis and Clark Water Quality District (Moore 2001) found that there are at least 3,461 undeveloped lots that already have been subdivided and have yet to be developed. For comparison, there are about 800 existing wells with water rights in the North Hills.

In regards to water quality protection, Lewis and Clark County administers a septic permitting system to insure that domestic sewage is properly disposed of and treated to protect surface and ground-water supplies. Also, the Lewis and Clark Water Quality Protection District was created in 1992 with the mission to preserve, protect, and improve water quality within the district boundaries. To fulfill its mission, the District has the following objectives:

1. Characterize the nature and extent of District water resources;
2. Response to citizens' concerns about water quality problems;
3. Educate the public about local water issues;
4. Facilitate planning for the prudent use of our municipal watersheds; and
5. Develop and implement water quality protection plans.

The district includes all of Lewis and Clark County. Its operations are funded by an annual levy on homes and businesses within the District boundaries. The District monitors 3 wells in the proposed CGA consistently for nitrates and periodically for static water levels, and additional wells sporadically for nitrates. The District also monitors static water levels quarterly for two other Montana Bureau of Mines and Geology monitoring wells in the proposed CGA.

Community Water Systems

The possibility of developing community water systems to import water to problem areas in the North Hills was suggested during the scoping process as an alternative to CGA designation. Developing community water systems would require funding for the infrastructure, and importing water would necessitate some creative technical and administrative processes. Potential water sources for such systems could be the Helena Valley Canal, or ground water from the Helena Valley Alluvial Aquifer. There are no existing proposals to use these sources, but their potentials are discussed briefly in the paragraphs that follow.

Using water from the Helena Valley Canal would require a water service contract with the U.S. Bureau of Reclamation, which pumps stored water into the canal from Canyon Ferry Reservoir, and concurrence of the Helena Valley Irrigation District. Presently, the canal is only operated during the summer irrigation season, while domestic water users would need a year-round supply. Operating the canal during the winter would cause logistical problems, such as icing, which may be difficult and expensive to solve. This surface water also would require treatment to meet drinking-water standards.

Piping water into the North Hills from ground-water production wells in the Helena Valley alluvium to the south may be the best potential alternative water supply source for the area. The alluvial aquifer in the valley is generally considered to be a better water supply than the surrounding bedrock aquifers, although there are limitations to this source. High-yield community water system wells in the Helena Valley alluvium would need to be approved through the water rights permitting system, and it is possible that permit applications for such wells would be contested by nearby existing ground-water users.

DNRC's Ability to Conduct a Study

The petitioners have requested that DNRC, with the assistance of DEQ, study the quality and quantity of the ground-water resources of the North Hills. During the scoping and draft EA review processes, some questioned whether the agencies would have the resources, both staff and financial, to do the study. The agencies do not have any funding in their current budgets specifically for this type of study. If it was decided that a temporary controlled ground-water area

and study were needed, the agencies and proponents for a controlled ground-water area would need to seek funding and staff support. Possible funding sources may be:

- U.S. Environmental Protection Agency (EPA), Regional Geographic Initiative Grants, Program funding cap: $30,000;
- DNRC Conservation District 223 program: Funding of up to $10,000 but would have to be applied for through the Lewis and Clark County Conservation District;
- DNRC Watershed Planning Assistance: for implementation of watershed planning activities, up to $10,000;
- DNRC Renewable Resource Grants: For projects that conserve, manage, develop, or protect Montana's natural resources. Grants of up to $100,000. Proposals must be sponsored by a governmental agency.

Staffing for a study would be another concern, because the state agencies do not have extra staff to work specifically on a North Hills ground-water study. Reviewing all new water right applications that are less than 35 gpm as suggested in the *Modified Permit Process Alternative,* would be difficult for the DNRC Helena Regional Office too. The Lewis and Clark County Water Quality District may be able to participate in a study by providing some staff assistance. Other possibilities would be to have much of the data collection for a study done by students, or to have a graduate student work on a study as a thesis project. If a temporary controlled ground-water area were created, DNRC would work with public entities and local groups to study and manage the ground-water resource as best it could with available staff and funding.

Under the *Modified Permit Process Alternative* and the *Water Quality Study Alternative* and *Ground-Water Study Alternative*, applicants who wished to develop new wells would have to submit ground-water data during the permit-review process. Because of this, the agencies would be able to use these data in a study, but the cost of the data collection would be paid for by the applicant.

5.2 Evaluation Criteria

The controlled ground-water area statutory criteria, followed by information available from past studies and additional information which could be collected during a future study, are described in this section.

A. *Ground-water withdrawals are in excess of recharge to the aquifer or aquifers within such ground-water area.*

A long period of precipitation and stream flow records, and data on potential evaporation and plant use, and soil and bedrock properties are necessary to understand the dynamic role of recharge in sustaining ground-water development. The study of the "Hydrology of the Helena Area Bedrock" (Thamke, 2000) developed a general understanding of these factors; however, this study covered 585 square-miles and, as a result, the information obtained specifically on the North Hills is not sufficiently detailed to evaluate long-term recharge. In contrast, studies conducted for subdivision projects contain more detailed information on specific sites but do not describe the role of recharge in determining sustainability of ground-water development in the North Hills as a whole.

Additional information on the nature and distribution of recharge could be collected in a prospective study.

B. *That excessive ground-water withdrawals are very likely to occur in the near future because of consistent and significant increases in withdrawals from within the ground-water area.*

Whether future ground-water withdrawals will be excessive depends on factors that are not well understood: the extent and pattern of future ground-water development, and changes in recharge to and discharge from the aquifer. A detailed understanding of aquifer boundaries, and the geometry and properties of fractures that transmit water are needed to evaluate the response of the aquifer system to future development. Past researchers have mapped fractures and described the history of geologic development of the North Hills, information that is necessary to describe the geometry of the aquifer system.

Descriptions of rock properties and water production during drilling of new wells, and water-level drawdown data from pumping tests could be used during a prospective study to characterize aquifer properties. In addition, water chemistry data could be used to evaluate ground-water flow patterns.

C. *That significant disputes regarding priority of rights, amounts of ground water in use by appropriators, or priority of type of use are in progress within the ground-water area.*

There have been numerous objections to proposed subdivisions on the basis of water availability and the potential for adverse impacts to water levels and yields of nearby wells. A focus of many of the objections has been methods of aquifer testing, and interpretation of aquifer test results. In addition, disputes regarding water rights currently are addressed on a case-by-case basis and DNRC does not consider cumulative effects of exempt wells that produce less than 35 gpm and 10 af of water per year.

An objective of a prospective study could be to develop standard testing and analysis methods for evaluating cumulative effects of new water appropriations.

D. *That ground-water levels or pressures in the area in question are declining or have declined excessively.*

Water levels analyzed for 12 wells by the U.S.G.S. for the period January 1992 through May 1998 do not indicate an overall declining trend (Thamke, 2000). However, hydrographs from 6 wells monitored by the U.S.G.S. and reports of 30 dry wells in the North Hills indicate water levels have declined from 1998 through 2001, and declining wells coincide with a period of below-average precipitation (see Appendixes B and C). However, ground-water withdrawals might have exacerbated declines.

A longer period of monitoring and an improved understanding of aquifer conditions is needed to understand the response of water levels to climatic conditions and changes in ground-water development. Also, depth and construction of wells that were replaced need to be investigated as possible causes of reported well problems.

E. *That excessive ground-water withdrawals would cause contaminant migration.*

Water samples from wells in the proposed CGA indicate elevated nitrate concentrations in areas of concentrated older septic systems. No studies have identified a direct causal connection between excessive ground-water withdrawals and nitrate concentrations, however.

Sampling of water from new wells, repeat sampling of wells sampled previously, and data reported for public water system wells can be used to identify spatial and temporal trends that may be related to ground-water withdrawals.

F. *That ground-water withdrawals adversely affecting ground-water quality within the ground-water area are occurring or are likely to occur.*

There is evidence of elevated nitrate levels in ground water within the proposed CGA boundaries, but no indication that ground-water withdrawals are causing migration of contaminants.

Again, wells can be sampled to identify trends that may be related to ground-water withdrawals.

G. *That water quality within the ground-water area is not suited for a specific beneficial use.*

Nitrate concentrations in 15 samples analyzed by the U.S.G.S. between 1994 and 1998 ranged from 0.05 to 17 mg/L. In one well nitrate concentrations have been sampled that are higher than the maximum contaminant level (MCL) of 10 mg/L set by EPA for public water supplies (Thamke, 2000). There are insufficient data to clearly demonstrate that nitrate levels are increasing; however, studies in the Helena Valley Aquifer and other areas demonstrate the potential for increased nitrate concentrations in ground water in areas served by septic systems.

Future sampling would provide a better understanding of the prevalence and causes of elevated nitrate in ground water in the North Hills

5.3 Need For An EIS

DNRC has determined that this EA is the appropriate level of environmental review for the North Hills CGA petition, because the proposal in the petition and the alternatives presented in this EA would not significantly affect the quality of the human environment. If the petition were acted on as proposed, the temporary moratorium on new ground-water appropriations would have an economic impact on some. However, the moratorium and associated impacts would be temporary: during the two-year study with a possible extension to 4 years. If, in the future, there was a proposal to create a permanent CGA in the North Hills, another environmental review in the form of an EA or EIS would be required.

Chapter 6 – Responses to Comments on the Draft EA

This Chapter contains responses to pertinent comments that were received on the draft EA. Some of the comments have been consolidated, clarified, or abbreviated, but the general meaning of the comments has been maintained. The responses also will point out where changes have been made to the EA text to address the comments. Some commentors have suggested minor editorial changes, and these suggested changes generally have been made to the EA text.

6.1 Controlled Ground-Water Area Process and Requirements

Comment: Many of the allegations in the petition are not substantiated. Allegations that ground-water discharges are in excess of recharge to the aquifer are clearly not substantiated for the entire proposed location. Allegations suggesting that ground-water levels in the North Hills are decreasing are without merit, because the most recent credible evidence from the USGS does not support the allegations. Insinuations contrary to existing facts and conclusions continue to be arbitrarily fabricated and reported in the petition. Suggesting the petition is deemed complete and complies with the established requirements (see the bottom of page 1 of the draft EA) is very preliminary and appears to reach beyond that required of the DNRC.

Response: The statements on the bottom of page 1 of the draft EA were included to point out that DNRC considers the petition complete because the petitioners have: (1) filled out the appropriate form, (2) obtained the required number of signatures, and (3) submitted alleged facts as required in Section 85-2-506. DNRC has not yet determined whether or not the petitioner's alleged facts are substantiated or whether they have merit. And DNRC will only make such findings when all evidence has been presented following the administrative hearing (see Montana Code 85-2-507(2)(iii)). In Section 5.2, DNRC has included a general evaluation of the CGA criteria as it relates to the proposed North Hills CGA, but please keep in mind that these are not legal findings of fact.

Comment: Chapter 2 speculates on the issues and alternatives associated with the petition. One issue of whether a controlled ground-water petition is the appropriate vehicle to address the petitioner's concerns was not stated in the EA. Substantial evidence exists suggesting ground-water levels exhibit no predominant failings as the result of over appropriation or disproportionate development. If local ground-water levels show decline in some areas, the decline likely results from inadequate appropriation works or a current climatic interval of parched recharge conditions. Attempts to suggest residents are over appropriating or home building is excessively progressing are unmerited.

Response: The issues presented in Chapter 2 were those that were brought to DNRC's attention during the public scoping process. Some of these issues were used in developing the alternatives. Montana statute 85-2-506 allows water users to petition for a controlled ground-water area and DNRC is obligated to act on a complete petition. Whether or not CGA designation is the appropriate vehicle to address the petitioners concern will be decided during the administrative hearing process.

6.2 Alternatives

Comment: What is the difference between Alternatives 3 and 5? Why are quantity and quality separated?

Response: Under Alternative 3 (the *Modified Permit Process Alternative*), a temporary CGA would be created, and permits would be reviewed and information collected only to study ground-water availability. Under Alternative 5 (the *Water Quality Study Alternative*), water quality concerns would be added and evaluated in the study, and water quality criteria would be considered during ground-water permit application reviews. The two alternatives were included in the EA to define the impacts for two different hypothetical decisions on the petition proposal. For example, it is possible that, following the administrative hearing, DNRC could find a need for a temporary CGA to study and protect the ground-water supply, but that water quality problems are not significant enough to warrant rules or a study specific to water quality.

Comment: I don't believe that the DNRC should be responsible for conducting a water quality study in conjunction with the water availability study as suggested in Alternative 2. The DEQ and the county should fund a water quality study. I think that there are some advantages of coordination of collecting data but the water availability and quality studies should be kept independent. The water availability study may go on for many years and the water quality study would likely go on indefinitely.

Response: Your comment is noted. Alternative 3 would include a temporary CGA, with permitting requirements, and no water quality study or permit criteria related to water quality, as you suggest.

Comment: We need an alternative with a study, but with no changes to the water-rights permit process. There should be an alternative allowing development while a study is completed.

Response: A new alternative has been added to Chapter 2: the *Ground-water Study Alternative.* This alternative is similar to what you have suggested.

Comment: I would support Alternative 3 - if objections are not considered/allowed on residential wells producing less than 35gpm. It is highly likely that every new well will be protested and that this will cause undue hardship on people who simply want to put their property to beneficial use. I'm confident that DNRC, as an unbiased resource agency, can review and permit wells during this "interim" period. After all, it's the petitioners allegation that present review procedures are inadequate - a modified water right permitting procedure addresses the concern.

Response: Your comment is noted. Alternative 3 was not changed, but you can bring this suggestion to the attention of the hearing examiner during the administrative hearing process.

Comment: Alternative 5, water quality is an issue that I believe should be resolved by the County Health Department and Water Quality Protection District. The isolated instances of nitrate contamination are easily explained and more easily resolved, involving only a few areas and homeowners that need to replace their failing drainfields with systems that meet current rules.

Response: The controlled ground-water area statutes (85-2-506 through 508) allow ground-water quality concerns to be used as a reason for the designation of a CGA, and for provisions if

a CGA is created to protect water quality. Map 6 in the EA summarizes existing data on nitrate concentrations within the proposed CGA boundaries. A decision on whether water quality stipulations will be considered in any CGA for the North Hills will be made following the administrative hearing process.

6.3 Ground-water Resources

Comment: Are any wells in the area not declining?

Response: Water levels were monitored in 12 wells in the North Hills during the USGS study, two had decreasing trends, two had increasing trends, and eight had no trends. Since 1998, all wells monitored by the USGS have declining water level trends.

Comment: I would suggest that the DNRC somehow determine the maximum draw in a given area that would allow current water levels to be maintained and regulate drilling of all wells to insure that that maximum is not exceeded.

Response: DNRC could attempt to estimate sustainable yield, that is, the yield that can be obtained without causing continual long-term water level declines. However, this would be a huge undertaking that would have to be undertaken on a very site-specific basis. Also, keep in mind that any amount of additional withdrawals will cause some amount of water level decline and, therefore, the "maximum draw" also depends on the amount of additional water level decline that can be tolerated.

Comment: Only four wells showed increased levels of nitrate: 90.55% were < 5 mg/l.

Response: Sampling conducted during the USGS study was not sufficiently comprehensive to justify making inferences about the overall prevalence of nitrate in the North Hills. There may be reason to study the occurrence of nitrate based simply on the fact that some high values were detected and that the fractured bedrock aquifer probably has little capacity to attenuate nitrate.

Comment: 83.93% of wells in area either declined less than 5 feet or increased.

Response: Water level hydrographs presented in the USGS study did not provide clear evidence of pervasive water level declines. However, continuing monitoring by the USGS and occurrences of dry wells are compelling evidence that water levels are declining in many wells.

Comment: The wells listed as declining or with water quality problems are outside of proposed CGA.

Response: Wells 145 and 153 from the USGS study are wells in the North Hills that had decreasing water level trends between January 1992 and May 1998. Wells 125, 129, 145, 153, and 165 have had decreasing water levels trends since 1998.

Comment: The maps on pages 11 & 12 do not reflect the proper number of wells nor their location in Section 7. South of Prairie Road and West of Montana Ave. Townview has three wells and Skyview has three. In addition there are other errors of well locations in Section 7.

Response: Well locations were approximated from Township-Range-Section locations in the DNRC database. As a result, wells with the same location in the DNRC database plot on top of each other and appear as a single dot on the map. More accurate locations were not determined because these figures were intended to show the general distribution of well yields and depths and not the exact location and number of wells.

Comment: It is a huge assumption to believe the recharge for underground water in this area is a localized source. The water could be coming from the major mountain ranges to the west or north or from valley sources.

Response: The DNRC does not make any assumptions regarding the sources of recharge to the North Hills bedrock aquifer system. One objective of a possible study could be to consider the importance of these, and other, potential sources of recharge.

Comment: I contend:

a) Domestic use is very close to non-consumptive use and does not cause general lowering of the water table.

Response: True, domestic water use, excluding lawn irrigation, is generally considered to be non-consumptive.

Comment: Even if a closure is implemented the water levels will probably continue to decline if the drought conditions persist.

Response: True, drought appears to be the primary factor responsible for water level declines. Water level declines resulting from increased withdrawals could exacerbate the magnitude of drought-related declines, however.

Comment: Although the intent of Alternative 3 is interesting, my concern with the alternative is that insufficient and questionable data will be obtained …

Response: The intention of Alternative 3 is to require that a qualified Hydrogeologist logs wells and conducts other necessary testing.

Comment: Precipitation measured at the airport is not an accurate measure of that received in the North Hills. We receive less than in Helena.

Response: Precipitation graphs for the Helena Regional Airport station were included in Appendix C of the EA to give the reader a general idea of the amounts of precipitation received in the area during the past 9 years, and how the precipitation during these years compares to long-term averages. The lower elevation areas of the proposed CGA receive, on average, a similar amount of precipitation to that which falls at the airport. The higher areas of the North Hills generally accumulate slightly more precipitation.

Comment: The map on page 9 does not show the location of Well #145 mentioned on page 35.

Response: Well #145 is located in Section 6 of Township 11 North, Range 4 West. This well is in the North Hills study area delineated in the USGS bedrock report but is approximately 1.5 miles west of the proposed CGA. The hydrograph for this well was included in the EA because it is in a similar geologic setting as the proposed CGA.

6.4 Land Use

Comment: On Page 16, Lots: The latest data used in the EA appear to go through the end of 2000. During the end of 2001 and in January 2002, a significant number of lots (several hundred) were created in the North Hills in addition to the 3,461 listed in the EA (page 26). As these lots have already been created, and do not require subdivision review, the possibility exists for even further harm to existing well owners if a closure does not take place during the period of the requested study.

Response: Figure 2 was included to depict the general trends of subdivision permitting in recent years. It includes only lots created through county subdivision review that have received final approval. Within the proposed CGA boundaries during 2001, there were 10 lots that were approved through the subdivision process and filed with the County Clerk and Recorders Office, and 49 that received preliminary approval (Lewis and Clark County, 2002).

6.5 Economics

Comment: I do not believe, in my professional opinion, that the sections proposed for exclusion meet the requirements of the law and rules of the DNRC if included in the CGA. I also believe that the EA does not actually address the true impact of excluding these areas from the CGA. There is no demonstration that the landowners with properly completed wells will incur any costs if these areas are excluded."

Response: Section 4.4, Alternatives 1 and 4 have been changed to acknowledge that the occurrence of future costs incurred by well owners in the omitted areas is unknown pending more information.

Comment: What is the market value of the lots and homes within the CGA, existing and proposed? What is the projected loss in real estate marketing resulting from the "threat" of dry wells and from a proposed prohibition on well drilling?

I suspect a realistic economic impact analysis would expose a significant incentive to solve this problem rather than prolong it. As such, the solution might be to create a regional water district and solicit financial participation from all the stake holders to initiate a permanent solution.

Response: The point that, ultimately, solutions to water management problems in the area may include the development of water supply systems is acknowledged in Section 4.4 under Alternative 1. Such an undertaking is most likely to occur when well owners and other property owners consider their interests to be best met by that course of action.

Comment: In (4.4) EA you assume that domestic use is affecting the water level in the area. I contend your study is to try and determine this fact or is it already decided?

Response: Section 4.4, Alternatives 1 and 4 have been changed to acknowledge that the occurrence of future costs incurred by well owners in the omitted areas is unknown pending more information.

Comment: If only +/- 800 lots have been developed and +/- 3460 lots are undeveloped, what rights do these owners have to water under their property? Water is plentiful in the majority of this area as shown by our more recent drilling, although it may be 20 ft. to 60 ft. deeper than 30 years ago. If the 3460 lots valued at up to $30,000 each are not allowed to use water we are looking at $60 million to $100 million loss to these people.

Response: If, in fact, water is plentiful, then owners of lots would be denied the opportunity to realize the economic potential of their property during the moratorium. The adequacy of water supplies in the area, however, is precisely the issue that prompted the petitioners to propose the CGA. Presumably, questions regarding the availability of water would be resolved to some degree by the study conducted under the proposal.

Comment: 4.4 Economics - Alternative 1 states "Existing well owners would continue to incur costs imposed by additional well development over the next two to four years." I haven't seen

any information that would support this statement. I have heard second hand that one high producing irrigation well has likely caused an adjacent well to "go dry." Please send me the information DNRC used to make this conclusive, all encompassing statement.

Response: Section 4.4, Alternatives 1 and 4 have been changed to acknowledge that the occurrence of future costs incurred by well owners in the omitted areas is unknown pending more information.

6.6 Water Rights

Comment: Under Alternative 3, what would objecting to a permit applications entail?

Response: The objection would have to be filed by the date specified by DNRC in a notice, and on the appropriate form. The objector would have to present facts indicating that one or more of the water rights criteria in MCA 85-2-311 are not met. There is a $25 fee to object to a permit application.

Comment: How do you prove adverse impact?

Response: Proving adverse impacts generally requires submitting evidence of direct well interference. The senior user could submit data indicating that the cone of depression from the junior's well extends under the senior's well. Other evidence could include water level data prior to and following the commencement of the junior's use.

Comment: The water rights data you are using over-rate home use. The accepted use of domestic homes is 300 to 400 gallons per day. The county uses 350 gallons per day for septic calculations.

Response: Figure 1 presents total ground-water rights volumes in the North Hills by purpose. Water rights for wells in the proposed CGA are summarized in Table 5 by number, and by filed rate and volume. This information was included to give a general overview of the rates and volumes of water rights in the area and the dominant uses; no attempt was made to summarize daily domestic use in the draft EA. Stated rates for domestic water rights in the North Hills are generally from 5 to 35 gallons per minute, but these are peak pumping rates and should not be extrapolated to calculate average daily uses. Domestic water rights volumes are stated in acre-feet per year, and in the North Hills 1 to 1.5 acre-feet of water per year is typically filed for. One acre-foot of water per year is often used to characterize the average water use by a family. If converted to gallons and averaged over the 365 days for a year, the 1 to 1.5 af/year would average to about 900 to 1,300 gallons of water per day. These amounts can include outside watering in addition to inside domestic use.

6.7 Need and DNRC's Ability to Conduct a Study

Comment: Under Chapter 5 - Need and Evaluation Criteria - DNRC's Ability to do a Study. This section is woefully inadequate. This section needs to go into much more detail on what the costs associated with the study would be, how it would be conducted to be accomplished within a reasonable time period, and how it will be paid for.

Response: In Chapter 5, DNRC has indicated in general terms what a study of the ground-water resources in the North Hills would entail. The controlled ground-water statutes (85-2-507(5)(b) MCA direct DNRC to commence studies when necessary for temporary controlled ground-water

areas. If the North Hills were designated as a temporary CGA, DNRC would work with other agencies and local groups to develop a study scope. And funding for a study would depend on DNRC and cooperating groups success at obtaining grants. The North Hills petitioners have indicated that they have gathered some funds, through contributions, for a potential study. Given the timelines available for completing this EA and the uncertainties regarding the eventual outcome of the petition proposal, DNRC believes that it is too early to develop a detailed study scope of work and budget.

Comment: There is abundant water in the valley fill aquifer and Lake Helena. We need to work on community water supplies and waste-water treatment systems. There are many rural water systems in the state already that import water to water-short areas. The solution might be to create a regional water district and solicit financial participation from all the stake holders to initiate a permanent solution.

Response: Developing community water supply and treatment systems is an option for addressing water supply and quality problems in the North Hills. This was not included as an alternative in Chapter 2 because DNRC is obligated to act on the petition that has been put forth. Developing plans for rural water systems would take more time and resources then DNRC has available to it for preparing an EA. The potential for community water systems was discussed briefly in Section 5.1 of the draft EA. The upper Missouri River basin is closed to most new surface water permits, which would preclude the use water from Lake Helena as a source. Evaluation of alternative sources of water for the North Hills would be valuable, but is outside of the scope of the CGA statutes (85-2-506 through 85-2-508 MCA)

Comment: On Page 26: "The need for a controlled ground-water area was questioned because some believe that the subdivision rules of DEQ and Lewis and Clark County require review that is adequate to protect the prior water user." If this were true, senior water right holder's wells would not have become unusable over the past 5 years, and ground-water contamination would not be occurring. It is clear that the current subdivision review process is not adequate to protect our ground water.

Response: It also was stated on page 26 of the draft EA, that DEQ and Lewis and Clark County requirements are only to determine whether there is likely to be enough water for the proposed developments: not to analyze potential impacts to prior water users.

Comment: A 2-to-4 year moratorium on well drilling would have enormous impacts. A complete EIS would need to be prepared to adequately address the impacts associated with any final order that would include a 2 - 4 year moratorium on wells in a 52 square mile area.

Response: The need for an EIS is discussed on page 31 of this EA.

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List Of Preparers

Tim Bryggman -	Demographics and Economics
Larry Dolan -	Project Coordination and Land Use
Russell Levens -	Ground-water Quantity and Quality

Appendix A: Summary of previous reports that contain information on the ground-water resources of the North Hills area.

Table 1. Summary of hydrologic studies conducted in the vicinity of the proposed North Hills CGA.

Title: Hydrology of Helena Area Bedrock, West-Central Montana, 1993-1998 (Thamke, 2000).

Objective: To assess the hydrology of the Helena area bedrock and to provide information that can be used to evaluate future changes in the hydrologic system.

Data Collection (specific to North Hills): Inventory of 36 water wells, monthly measurements of water levels in 24 wells, and collection of water-quality samples from 15 wells.

Conclusions:

- Average precipitation in the North Hills ranges from 10 to 16 inches and provides limited recharge to bedrock during times of favorable precipitation and soil moisture conditions.
- Perennial streams in the North Hills are mainly areas of discharge.
- Ephemeral or intermittent streams likely provide some recharge during times of runoff.
- Recharge from the Helena Valley irrigation canal and applied irrigation water is limited to the southern foot of the North Hills; the overall recharge from these sources to the North Hills bedrock probably is small.
- Yields from 36 wells in the North Hills bedrock ranged from 6 to 100 gal/min, with a median yield of 20 gal/min.
- Water levels analyzed for 12 wells for the period January 1992 through May 1998 indicated a decreasing trend for 2 wells, an increasing trend for 2 wells, and no trend for 8 wells.
- Nitrate concentrations measured in water samples from 15 wells ranged from less than 0.05 to 17 mg/L. Water from one well had nitrate concentrations greater than 10 mg/L; the likely source of the high nitrate in water from the well is human or animal waste.
- Availability of water in Helena area bedrock differs areally across short distances as a result of precipitation, evapotranspiration, and the heterogeneous character of the rock types and joint, fracture, and fault systems in the many different geologic units.
- Water levels in wells fluctuate in response to natural and human-induced recharge and discharge.

Title: Hydrogeology of the Helena Valley-Fill Aquifer System, West-Central Montana (Briar and Madison, 1992)

Objective: To describe the hydrogeology of the valley-fill aquifer system.

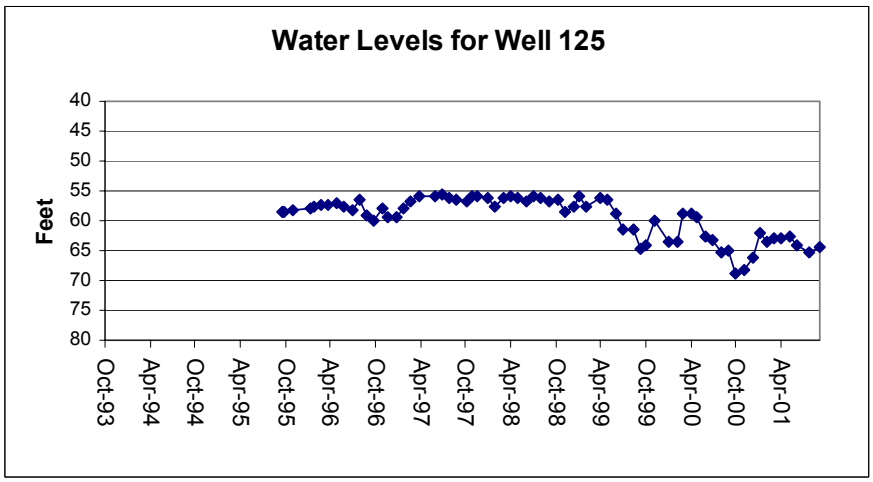
Data Collection (all in valley-fill sediments): Inventory of 1,400 wells and drilling of 23 test holes. Completion of seven aquifer tests, measurement of water levels in 84 wells, and measurement of water quality in 93 wells. Measurement of streamflows continuously at three sites and periodically at 14 sites.

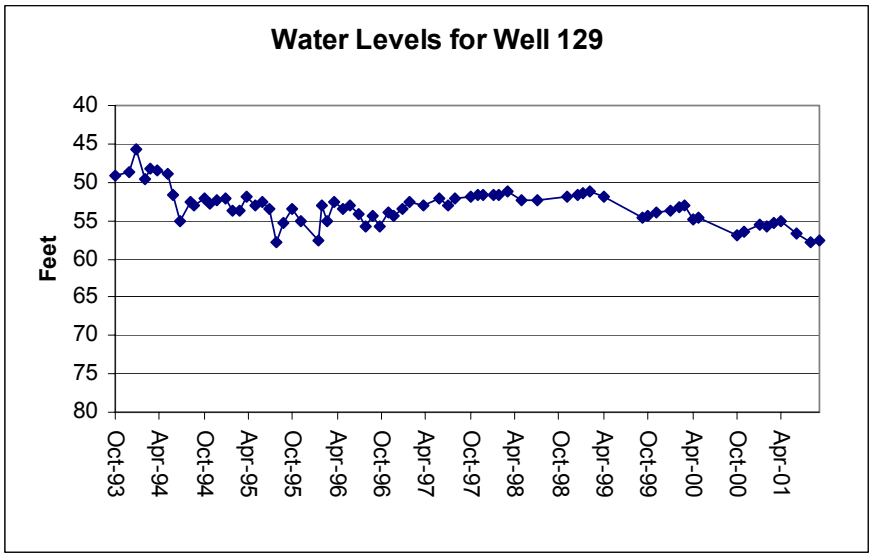
Conclusions:

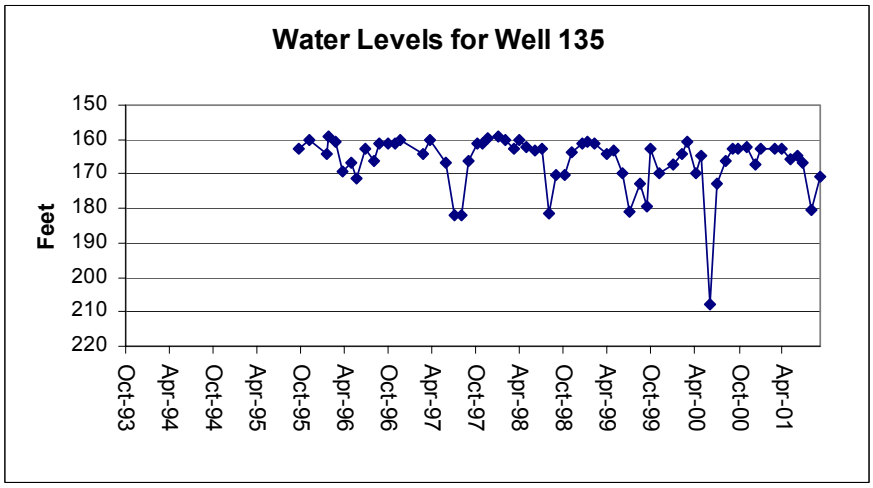
- Recharge to the Helena valley-fill aquifer system is through infiltration of streamflow (12,900 acre-ft/yr), leakage from irrigation canals (7.060 acre-ft/yr), infiltration of excess water applied to irrigated fields (27,000 acre-ft/yr), and inflow from fractures in the surrounding bedrock (39,800 acre-ft/yr).
- Evaporation and transpiration from non-irrigated parts of the valley exceed precipitation; therefore, recharge from precipitation occurs only in response to infrequent periods of sustained precipitation or as part of excess water applied to irrigated fields.
- Despite an apparently anomalous distribution of nitrate in the valley-fill aquifer system, some degree of correlation seems to exist between areas having the largest concentration of nitrate in water samples and areas having the largest density of private septic systems.

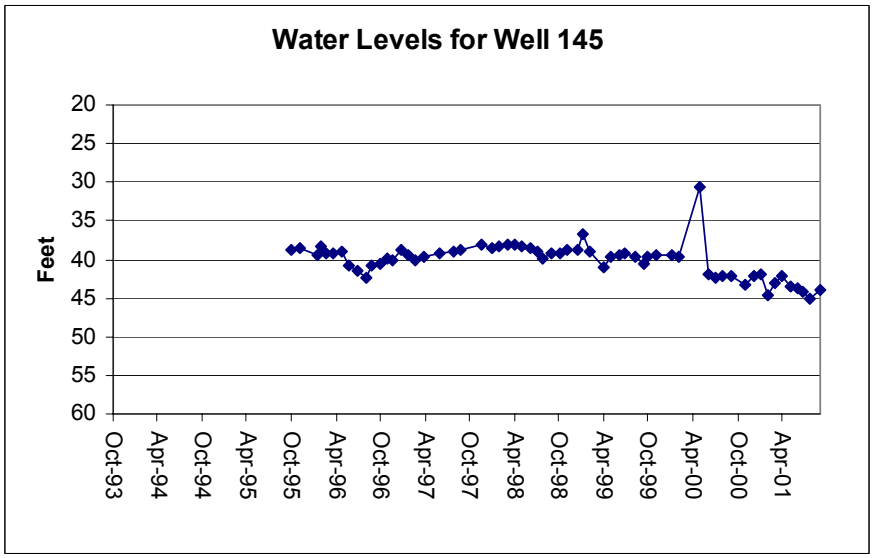
Appendix B: Water levels for wells that are still monitored by the USGS in the North Hills Area.

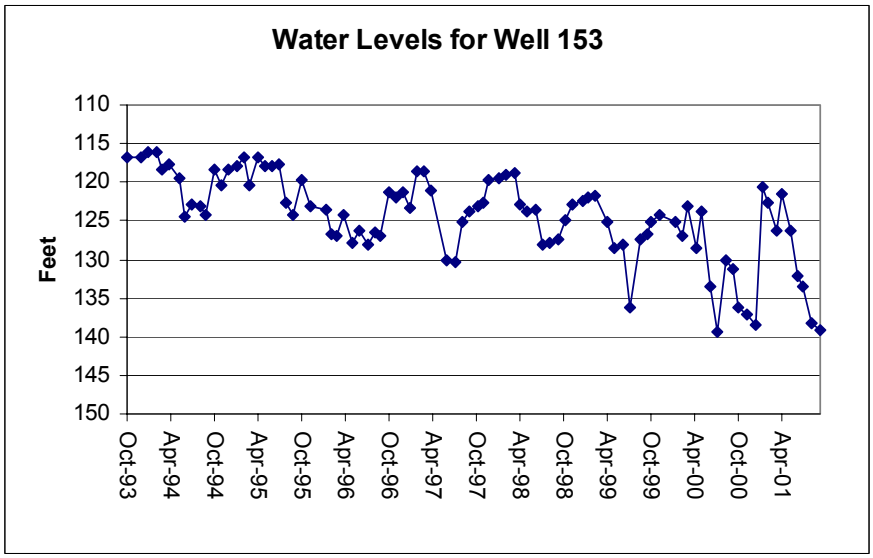
(Source: USGS unpublished data 2001)








Water Levels for Well 145
Feet
20
25
30
35
40
45
50
55
60
Oct-93
Apr-94
Oct-94
Apr-95
Oct-95
Apr-96
Oct-96
Apr-97
Oct-97
Apr-98
Oct-98
Apr-99
Oct-99
Apr-00
Oct-00
Apr-01


Water Levels for Well 153
Feet
110
115
120
125
130
135
140
145
150
Oct-93
Apr-94
Oct-94
Apr-95
Oct-95
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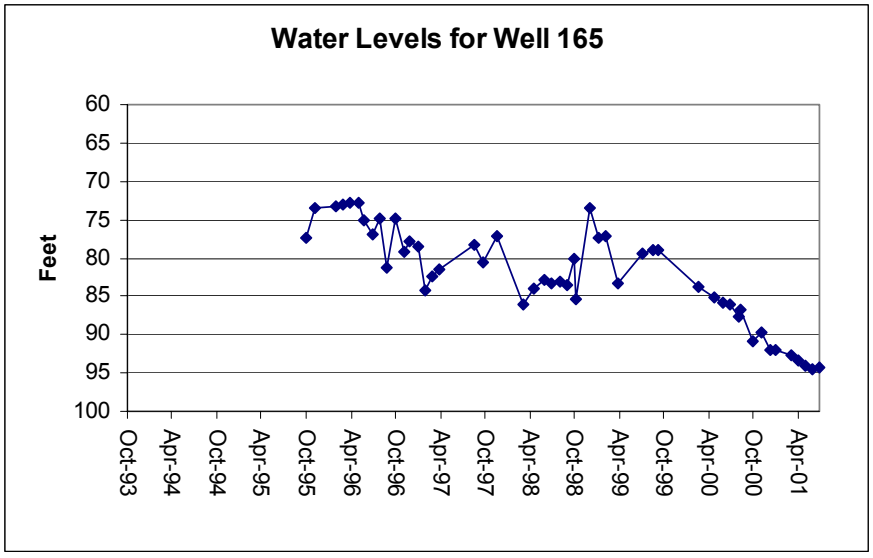
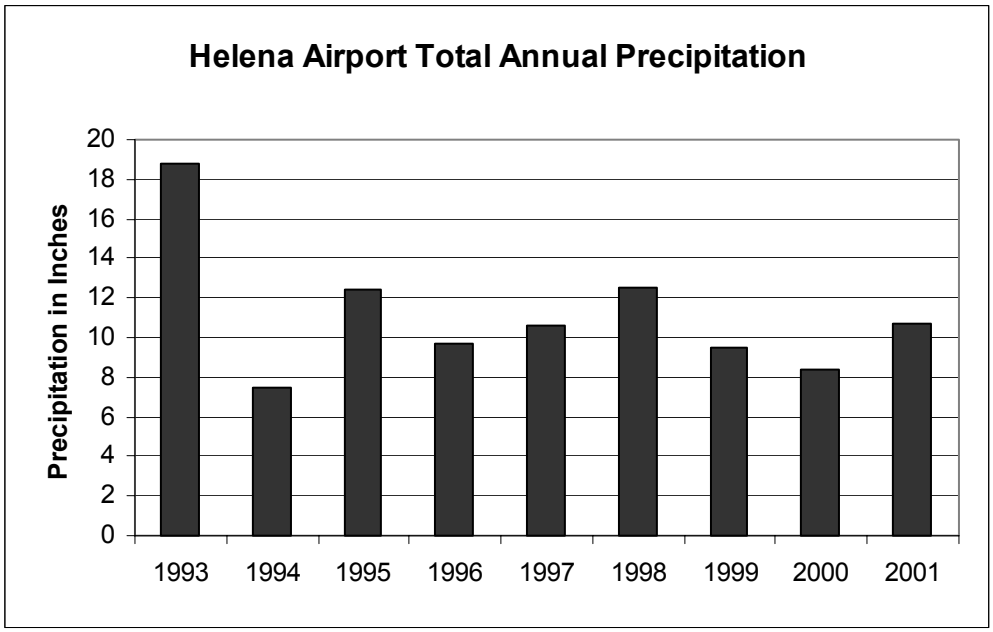
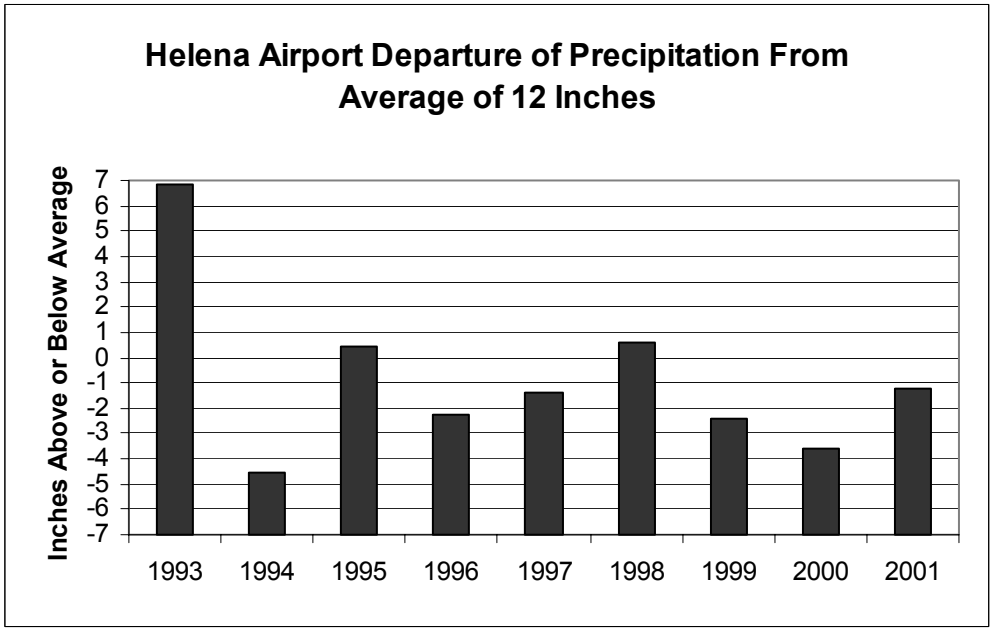
Oct-98
Apr-99
Oct-99
Apr-00
Oct-00
Apr-01


Water Levels for Well 165
Feet
60
65
70
75
80
85
90
95
100
Oct-93
Apr-94
Oct-94
Apr-95
Oct-95
Apr-96
Oct-96
Apr-97
Oct-97
Apr-98
Oct-98
Apr-99
Oct-99
Apr-00
Oct-00
Apr-01

Appendix C: Precipitation data summaries for Helena Regional Airport.

(Source: National Weather Service data)





Appendix D: Copy of controlled ground-water area petition